

CLAIMS

1. A method for creating an image processing procedure for an X-ray inspection apparatus which inspects an article by applying X-rays to the article, and processes
5 an X-ray image created based on the detected X-rays transmitted through the article, the method comprising the steps of:

providing a plurality of image processing procedures;

processing the X-ray image through each of the image processing procedures, and
calculating a degree of adaptability of each of the image processing procedures with respect to
10 the X-ray image; and

automatically selecting an optimum image processing procedure to be used for inspection based on the degree of adaptability.

2. An X-ray inspection apparatus which inspects an article by applying X-rays
15 thereto and processes an X-ray image created based on the detected X-rays transmitted through the article, the apparatus comprising:

an image acquisition unit that detects X-rays that were applied to the article, and acquires an X-ray image of the article; and

an image processing procedure adoption determination unit that processes the X-ray
20 image acquired by the image acquisition unit through a plurality of image processing procedures, calculates a degree of adaptability of each of the image processing procedures with respect to the X-ray image, and automatically selects an optimal image processing procedure to be used for inspection based on the degree of adaptability.

3. The X-ray inspection apparatus according to claim 2, wherein the image acquisition unit actually detects X-rays that were applied to the article in order to newly
25 acquire the X-ray image.

4. The X-ray inspection apparatus according to claim 2, wherein the image acquisition unit retrieves and acquires the X-ray image from a memory unit that stores
30 previously acquired X-ray images.

5. The X-ray inspection apparatus according to any one of claims 2 through 4, wherein the image processing procedure adoption determination unit randomly combines

predetermined image processing components to create the plurality of image processing procedures.

5 6. The X-ray inspection apparatus according to claim 5, wherein the image processing components are filters for processing the X-ray image.

10 7. The X-ray inspection apparatus according to any one of claims 2 through 6, wherein the image processing procedure adoption determination unit creates a plurality of new image processing procedures based on the degree of adaptability thereof, and repeats a routine for calculating the degree of adaptability in order to determine an image process procedure to adopt.

15 8. The X-ray inspection apparatus according to any one of claims 2 through 7, further comprising:
a contaminant determination unit that inspects whether or not the article subject to inspection contains a contaminant, based on the X-ray image processed by the image processing procedure that was selected by the image processing procedure adoption determination unit based on the degree of adaptability.

20 9. The X-ray inspection apparatus according to claim 8, wherein the image acquisition unit acquires an image of a non-defective article subject to inspection, and blends the image of the non-defective article with an image of hypothetical contaminants of predetermined amount and size in order to create the X-ray image.

25 10. The X-ray inspection apparatus according to claim 9, wherein the image acquisition unit actually detects X-rays that were applied to the article in order to newly acquire the image of a non-defective article.

30 11. The X-ray inspection apparatus according to claim 9, wherein the image acquisition unit retrieves and acquires the image of the non-defective article from a memory unit that stores previously acquired images of non-defective articles.

12. The X-ray inspection apparatus according to any one of claims 9 through 11, wherein the image acquisition unit retrieves a X-ray image of an article containing

contaminants from a memory unit that stores previously acquired X-ray images of articles containing contaminants, and uses an X-ray image in which the locations of the contaminants therein are specified as the image of hypothetical contaminants.

5 13. The X-ray inspection apparatus according to any one of claims 9 through 11, wherein the image acquisition unit acquires an X-ray image of a non-defective article mixed with predetermined contaminants, and uses the X-ray image as an image of test contaminants by specifying the locations of the contaminants in the image.

10 14. The X-ray inspection apparatus according to any one of claims 2 through 13, wherein the image processing procedure adoption determination unit calculates the degree of adaptability of the image processing procedure in view of the processing time for each image processing procedure.

15 15. The X-ray inspection apparatus according to any one of claims 2 through 14, wherein the image processing procedure adoption determination unit calculates the degree of adaptability at least based on the minimum and average brightness values of contaminants, and the maximum brightness value of areas excluding contaminants, in the resulting processed X-ray image.

20 16. The X-ray inspection apparatus according to any one of claims 2 through 15, wherein the image processing procedure adoption determination unit creates a next-generation image processing procedure by blending two image processing procedures selected from the plurality of image processing procedures.

25 17. The X-ray inspection apparatus according to any one of claims 2 through 16, wherein the image processing procedure adoption determination unit repeats the optimization of the image processing procedures until a predetermined number of generations is reached, a predetermined degree of adaptability is achieved, or a predetermined time period lapses.